

Responsive to the Examiner's contention that the term "dicing" is inappropriate, Applicants have amended claim 17, keeping in mind the comments offered by the Examiner, and submit that claim 17 is now in allowable form.

Responsive to the rejection of claims 1-5, 8-12, 15-16 and 19-20 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,033,581 (Kobayashi), Applicants have amended claims 1, 9 and 15, canceled claim 16, and submit that claims 1-5, 8-12, 15 and 19-20 are now in condition for allowance.

Kobayashi discloses a silicon substrate 1 (Fig. 3) on which ink discharge pressure elements 5, ink flow paths and discharge openings 4 have been formed (column 3, lines 24-26). Thermal oxidized film 10 (Fig. 7) is processed by photolithography to pattern film 10 by use of a photomask 12 (Fig. 9) having a pattern corresponding to ink feed openings 2 and grooves 3 that are formed around openings 2 and that are intended to prevent the adhesive from flowing (column 3, line 63 through column 4, line 1). A support 6 (Fig. 4) is made of aluminum. Ink feeding holes 8 and protrusions 7 surrounding them, which respectively face openings 2 and grooves 3, are formed by mechanical processing. An adhesive 9 (Fig. 6) is coated on the outskirts of protrusions 7, and thereafter the silicon substrate 1 on which the anisotropic etching has been completed is put together and bonded (column 5, lines 38-46).

In contrast, claim 1, as amended, recites in part:

a heater chip including a backside with at least one cavity;

a substrate associated with said backside of said heater chip, said substrate having a substantially flat surface; and

adhesive at least partially disposed within said at least one cavity, said adhesive adhering said backside of said heater chip to said substantially flat surface of said substrate.

(Emphasis added). Applicants submit that such structure is neither taught, disclosed nor suggested by Kobayashi and includes distinct advantages thereover.

Support 6 of Kobayashi does not have a substantially flat surface to which heater chip 1 is adhered. Rather, the surface of support 6 to which heater chip 1 is adhered has protrusions 7. Thus, Kobayashi does not disclose or suggest a heater chip including a backside with at least one cavity, a substrate associated with the backside of the heater chip, the substrate having a substantially flat surface, and adhesive at least partially disposed within the at least one cavity, with the adhesive adhering the backside of the heater chip to the substantially flat surface of the substrate, as recited by amended claim 1.

The present invention, as recited by claim 1, includes distinct advantages over Kobayashi. A flat substrate is easier to manufacture than one having protrusions. Also, without protrusions on the substrate, more of the adhesive is contained within the cavity on the backside of the heater chip, thereby increasing the accuracy and precision of the bond line. A precise bond line is especially important for applications that require multiple ink vias. Since each of the vias may carry a different color ink, sealing between the ink vias is crucial to prevent cross contamination between different colored inks (page 5, lines 3-6 of the present specification).

For all of the foregoing reasons, Applicants submit that claim 1, and claims 2-5 and 8 depending therefrom, are in condition for allowance, which is hereby respectfully requested.

Claim 8 recites in part that "said adhesive is substantially entirely disposed within said at least one cavity." (Emphasis added). Applicants submit that such structure is neither taught, disclosed nor suggested by Kobayashi and includes distinct advantages thereover.

The Examiner states "Kobayashi discloses that the adhesive is substantially entirely disposed within at least one cavity (Fig. 6)." Applicants respectfully submit, however, that Fig. 6 of Kobayashi

shows that a great majority of the adhesive is not disposed in grooves 3. Rather, it is clear that greater than 80% of the adhesive is between the flat lower surface of heater chip 1 and the flat upper surface of support 6, with less than 20% of the adhesive being in grooves 3. Thus, Kobayashi does not disclose or suggest adhesive substantially entirely disposed within at least one cavity, as recited by claim 8.

The present invention, as recited by claim 8, includes distinct advantages over Kobayashi. By the adhesive being substantially entirely disposed within the at least one cavity, the accuracy and precision of the bond line is improved, with all of the associated advantages discussed above with regard to claim 1.

For all of the foregoing reasons, Applicants submit that claim 8 is in condition for allowance, which is hereby respectfully requested.

In addition to the above arguments, Applicants point out that claim 8 depends from claim 1, which is in condition for allowance for all of the reasons given above. Accordingly, claim 8 is also in condition for allowance, which is hereby respectfully requested.

Claim 9, as amended, recites in part "a heater chip including a backside having at least one cavity; and adhesive substantially entirely disposed within said at least one cavity, said adhesive configured for adhering said backside of said heater chip to a substrate." (Emphasis added). Thus, claim 9, as amended, recites subject matter substantially similar to the subject matter of claim 8. For all of the reasons given above with regard to claim 8, Applicants submit that claim 9, and claims 10-12 depending therefrom, are also in condition for allowance, which is hereby respectfully requested.

Claim 15, as amended, recites in part "micromachining at least one cavity in a backside of a heater chip; and adhering said backside of said heater chip to a substrate such that adhesive is at least partially disposed within said at least one cavity." (Emphasis added). Applicants submit that such

limitations are neither taught, disclosed nor suggested by Kobayashi and includes distinct advantages thereover.

micromachining

The Examiner states that "Kobayashi discloses that the cavity is formed by micromachining (Column 5: line 40-42)." Applicants respectfully point out, however, that the passage cited by the Examiner refers to ink feeding holes 8 and protrusions 7, not grooves 3, being formed by mechanical processing. Kobayashi only discloses that grooves 3 are formed by anisotropic etching, not by micromachining. Thus, Kobayashi does not disclose or suggest micromachining at least one cavity in a backside of a heater chip; and adhering the backside of the heater chip to a substrate such that adhesive is at least partially disposed within said at least one cavity, as recited by amended claim 15.

For all of the foregoing reasons, Applicants submit that claim 15, and claims 19-20 depending therefrom, are in condition for allowance, which is hereby respectfully requested.

Claims 6-7, 13-14 and 21 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi in view of U.S. Patent No. 5,751,324 (Brandon, et al.). However, claims 6-7 depend from claim 1, which is in condition for allowance for the reasons given above; claims 13-14 depend from claim 9, which is in condition for allowance for the reasons given above; and claim 21 depends from claim 15, which is in condition for allowance for the reasons given above. Accordingly, claims 6-7, 13-14 and 21 are also in condition for allowance, which is hereby respectfully requested.

Responsive to the rejection of claims 17-18 under 35 U.S.C. 103(a) as being unpatentable over Kobayashi in view of U.S. Patent No. 5,821,972 (Mey, et al.), Applicants have canceled claim 18. Claim 17 depends from claim 15, which is in condition for allowance for the reasons given above. Accordingly, claim 17 is also in condition for allowance, which is hereby respectfully requested.

For the foregoing reasons, Applicants submit that the pending claims are definite and do particularly point out and distinctly claim the subject matter that Applicants regard as the invention.

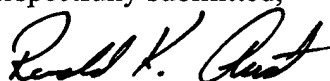
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Moreover, Applicants submit that no combination of the cited references teaches, discloses or suggests the subject matter of the amended claims. The pending claims are therefore in condition for allowance, and Applicants respectfully request withdrawal of all rejections and allowance of the claims.

In the event Applicants have overlooked the need for an extension of time, an additional extension of time, payment of fee, or additional payment of fee, Applicants hereby conditionally petition therefor and authorize that any charges be made to Deposit Account No. 20-0095, TAYLOR & AUST, P.C.

Should any question concerning any of the foregoing arise, the Examiner is invited to telephone the undersigned at (317) 894-0801.

Respectfully submitted,



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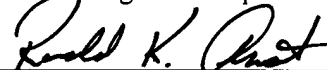
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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Washington, DC 20231, on: September 21, 2001.

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Signature

September 21, 2001

Date



PATENT

Title: HEATER CHIP FOR AN INKJET PRINthead

Application Serial No.: 09/625,345

Group 2853

Examiner: L. TRAN

ATTACHMENT A:
MARKED-UP COPY SHOWING AMENDMENTS

IN THE CLAIMS

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1. (Amended) An ink jet printhead assembly, comprising:

a heater chip including a backside with at least one cavity;

a substrate associated with said backside of said heater chip, said substrate having a substantially flat surface; and

5 adhesive at least partially disposed within said at least one cavity, said adhesive adhering said backside of said heater chip to said substantially flat surface of said substrate.

9. (Amended) A heater chip assembly for use in an ink jet printhead, said heater chip assembly including:

a heater chip including a backside [configured for being adhered to a substrate, said backside including] having at least one cavity [configured for receiving adhesive therein] ; and

5 adhesive substantially entirely disposed within said at least one cavity, said adhesive configured for adhering said backside of said heater chip to a substrate.

15. (Amended) A method of assembling an ink jet printhead, said method comprising the steps of:

[creating] micromachining at least one cavity in a backside of a heater chip; and

5 adhering said backside of said heater chip to a substrate such that adhesive is at least partially disposed within said at least one cavity.

17. (Amended) The method of claim 15, wherein said [creating] micromachining step includes [dicing] cutting said at least one cavity into said heater chip.